

REMARKS

The Office examined claims 1-6 and rejected same. With this paper, claims 1, 3-5 are amended, claim 2 is canceled, and none are added. Hence, there are 5 claims remaining in the application.

Objections due to Informalities

The Office action objected to the specification, abstract and the claims because the word “oligomer” was mistaken as “origomer”. With this paper, all the instances of “origomer” in the application have been changed to “oligomer”. Applicant is regretful for the mistake.

Claim Rejections under 35 USC §112

Claims 1-6 are rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With this paper, claim 1 is amended to read:

“... each polymer of said reactive oligomer and/or reactive prepolymer and said reactive diluent has a glass transition point between 0° and 70°C ... ”

It is believed that the change will overcome the grounds for the rejections under 35 USC §112, second paragraph. Accordingly, applicant respectfully requests the rejection of claim 1 under 35 USC §112, second paragraph, be reconsidered and withdrawn.

Claim Rejections under 35 USC §102

Claims 1-2 are rejected under 35 USC §102(e) as being anticipated by Ylitalo *et al* (US Patent No. 6,558,753).

Claim 1 recites an ink composition for inkjet printing, comprising (1) a coloring component, (2) a reactive oligomer and/or a reactive prepolymer, (3) a reactive diluent, and (4) a photoinitiator. Each polymer of the reactive oligomer and/or the reactive prepolymer (2) and the reactive diluent (3) has a glass transition point (T_g) between 0° and 70°C.

Claim 2 (now canceled and features been incorporated into claim 1) further limits the difference in the glass transition point (Tg) of the polymer of the reactive oligomer and/or the reactive prepolymer (2) and the polymer of the reactive diluent (3) to be at most 30°C.

Whereas, at the location cited by the Examiner (col. 4, line 65, to col. 5, line 8), Ylitalo discloses a jettable ink composition. The composition includes (1) one or more oligo/resins, (2) a radiation curable component comprising a radiation curable, reactive diluent having a surface tension, (3) from about 1 to about 15 weight percent of a solvent having a surface tension, and (4) an amount of a colorant effective to provide the ink when cured with a visually discernable optical characteristic.

Based on the following reasons, the applicant attests that Ylitalo does not anticipate the present invention:

First, the compositions of Ylitalo are described as using for signs, walkways, roadways, motor vehicles, boats, aircraft, furniture, equipment, and the like (col. 1, lines 19-20). Therefore, in order to promote hardness and abrasion resistance of resultant cured material, it is preferred that a reactive diluent comprises monomers whose homopolymer have a high Tg. Ylitalo teaches that the reactive diluent may contain a high Tg component having a Tg of at least about 50°C, preferably at least about 60°C, and more preferably at least about 75°C. This high Tg component may constitute 0.5 to 50, preferably 0.5 to 40, more preferably 0.5 to 30 weight percent of the radiation curable, reactive diluent (col. 11, line 58 to col. 12, line 10, cited by the Examiner).

On the other hand, Ylitalo fails to provide a specific Tg range for one or more oligo/resins, as well as the difference in Tg between the polymer of the reactive diluent and the polymer of the reactive oligomer and/or reactive prepolymer (the oligo/resins). However in Ylitalo, acrylated urethanes are described as a reactive oligomer. Acrylated urethanes are generally low Tg oligomers. In the examples shown in the present application, acrylated urethanes have a Tg of 14°C and -37°C, respectively.

Therefore, the difference in Tg of the reactive diluent and the reactive oligomer is at least 36°C (=50°C-14°C), and Ylitalo does not intend to make the difference smaller. Instead, Ylitalo allows it be larger by preferring the reactive diluent with even higher Tg.

Second and perhaps more importantly, Ylitalo discloses that the jettable ink composition includes essentially a solvent having a surface tension, and the solvent constitutes from about 1 to about 15 weight percent of the ink composition (see Abstract). Examples of the solvent are given in the specification (col. 15, lines 27-41).

On the contrary, the ink composition of the present invention does not contain a solvent component that is equivalent to Ylitalo. The fact that Ylitalo relies on a solvent in the ink composition while the present invention doesn't substantiates that the present invention is not anticipated by Ylitalo.

The applicant respectfully submits that, since Ylitalo proclaims that a high Tg reactive diluent component is preferable and a solvent with a surface tension is essential in a jettable ink composition, Ylitalo teaches away from the present invention which emphasizes that both reactive oligomer/prepolymer and reactive diluent should have a Tg between 0°C and 70°C and the difference in Tg is no more than 30°C, and a solvent component is absent.

From the above reasons, applicant believes that claim 1 as amended is not anticipated by Ylitalo. Therefore, applicant respectfully requests that the rejection of claim 1 be reconsidered and withdrawn.

Claims 1-2 are further rejected under 35 USC §102(b) as being anticipated by Murphy *et al* (US Patent No. 6,040,357).

Murphy discloses an ink composition that is not intended for inkjet printing but for coating glass fibers. According to Murphy, the ink composition should have a Tg of at least about 30°C, preferably at least about 50°C (col. 4, lines 23-24, cited by the Examiner). Further, Murphy teaches that the preferred ink composition contains both a radiation-curable oligomer and a radiation-curable diluent monomer (col. 9, lines 33-45).

The Office action noted that Murphy discloses, by examples, that the Tg of oligomers are about 65°C and about 42°C. However, throughout the cited reference, Murphy does not disclose a Tg range for the polymer of the radiation-curable diluent monomer, and therefore, no difference in Tg between the oligomer and the reactive diluent monomer is taught or suggested.

Also, as it is seen throughout the reference, Murphy's ink composition is not intended for inkjet printing use. It is known in the art that the viscosity and colorant characteristics of the inks for inkjet printing are very much different from inks for coating. Even though the two have similar ingredients, one cannot substitute for another.

In order to differentiate the ink composition according to the present invention and the ink coating formula disclosed by Murphy, in claims 1 and 3 the word "ink" is amended to read "ink jet ink".

From the above reasons, applicant believes that claim 1 as amended is not anticipated by Murphy. Therefore, applicant respectfully requests that the rejection of claim 1 be reconsidered and withdrawn.

Claims 3-5 are rejected under 35 USC §102(b) as being anticipated by Erickson *et al* (US Statutory Invention Registration No. H1517).

Claim 3 recites an ultraviolet ray curable inkjet ink composition having a viscosity of 60 to 800 cps at 25°C. Claim 4 recites that the reactive oligomer and/or reactive prepolymer in the ink composition has a viscosity of 40 to 10000 cps at 60°C. In the specification, the reactive oligomers are disclosed as acrylates. Acrylate monomers are esters that contain one carbon-carbon double bond directly attached to the carbonyl carbon (a vinyl group).

On the other hand, Erickson discloses a radiation curable printing ink composition comprising a liquid viscous epoxidized diene polymer and a pigment. The epoxidized diene polymer is disclosed as having a viscosity of 5000 cps or less. A diene monomer is a molecule that contains two carbon-carbon double bonds.

Comparing the above disclosures, although Erickson teaches an epoxidized diene polymer having a viscosity of about 5000 cps as one of the components in a printing ink, the viscosity of an ink composition comprising it is not described. It is known in the art that the viscosity of ink varies widely according to its composition and other parameters such as temperature. It is not possible to assess the viscosity of ink based only on the viscosity of one of the components.

Also, the oligomers/monomers used in the present invention and polymers taught by Erickson are different as one is acrylate based (one carbon-carbon double bond in one unit) and another is diene based (two carbon-carbon double bond in one unit).

Erickson describes that the ink composition is used for flexographic and gravure inks, letter press inks, and screen inks. A preferred use is for lithographic inks (col. 8, lines 1-6). There is no description about inkjet printing.

From the above reasons, applicant believes that Erickson does not anticipate claims 3-5. Therefore, applicant respectfully requests that the rejections of claims 3-5 be reconsidered and withdrawn.

Claims 3-6 are rejected under 35 USC §102(e) as being anticipated by Yurugi *et al* (US Patent No. 6,767,980).

Yurugi describes a reactive diluent composition comprising a vinyl ether group-containing (meth)acrylic ester and a hydroxyl group-containing polymerizable compound having a viscosity from 0.1 mPa.s(cps) to 1500 mPa.s(cps) at 25°C. The reactive diluent is used in a curable resin having a wide range of a viscosity (preferably 0.5 cps to 100,000 cps at 25°C).

More specifically, Yurugi teaches that a radiation-curable inkjet ink composition comprising the above-formulated radiation curable resin has a viscosity of 1.2 cps to 50 cps at 25°C (column 27, lines 57-60). Claim 3 of the present invention, however, draws to an inkjet ink that has a viscosity of 60 to 800 cps at 25°C. Thus, the inkjet ink composition of Yurugi is different from the present invention.

As mentioned above, claim 3 has been amended to limit the ink composition to inkjet ink composition. Since claim 3 as amended is believed to be allowable for the forgoing reasons, applicant respectfully requests that the rejection of claim 3 be reconsidered and withdrawn.

The applicant also requests that the rejections of claims 4 and 5, being dependent on the claim 3, be reconsidered and withdrawn.

Independent claim 6 recites a inkjet printing method that comprises the step of heating the ink composition of claim 3 to 40° to 150°C. The Examiner pointed to a location in Yurugi for an inkjet printing method (col. 25, line 63, to col. 26, line 24). However, in the location cited by the Examiner, Yurugi does not disclose an inkjet print method that includes the step of heating the ink composition to 40° to 150°C. In fact, considering that the viscosity of the inkjet ink as disclosed by Yurugi is lower than that of the present invention, it is obvious that Yurugi does not intend to heat the ink composition when printing. Therefore, the applicant respectfully submits that, Yurugi does not anticipate the present invention.

Based on the above reasons, applicant respectfully requests that the rejection of claim 6 be reconsidered and withdrawn.

Conclusion

For all the foregoing reasons it is believed that all of the claims of the application are now in condition for allowance, and their passage to issue is earnestly solicited. Applicant's attorney urges the Examiner to call to discuss the present response if anything in the present response is unclear or unpersuasive.

Respectfully submitted,

A handwritten signature in black ink that reads "Francis J. Maguire". The signature is written in a cursive style with a long horizontal stroke extending to the right.

Francis J. Maguire
Attorney for the Applicant
Registration No. 31,391

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ATH/mbh
WARE, FRESSOLA, VAN DER SLUYS
& ADOLPHSON LLP
755 Main Street, PO Box 224
Monroe CT 06468
(203) 261-1234